THERAPEUTIC ASPECTS OF EYEGLASS LENSES

Objectives
- At the conclusion of this session the participants will:
  1. Have an understanding of how eyeglass lenses can assist in the treatment of medical disorders
  2. Become familiar with the most commonly treated medical conditions
  3. Have the tools to discuss medical eyeglass lens treatments

Background
- We are seeing the very early stages of a change in how we think about ophthalmic lenses.
- This is exciting stuff for optometrists and opticians!
  - In addition to the traditional use of lenses for refractive correction
  - We now see true scientific studies showing ophthalmic lenses can provide an additional health benefit by blocking certain wavelengths of light.
  - They are often referred to as therapeutic lenses.

Agenda
- Therapeutic eyeglass lenses for treatment of:
  - Achromatopsia
  - Age related macular degeneration (AMD)
  - Cataracts
  - Corneal pathology
  - Diabetic Retinopathy
  - Glaucoma
  - Night Blindness
  - Retinitis Pigmentosa
  - Attention deficit hyperactivity disorder (ADHD – Symptom Improvement)
  - Seasonal Affective Disorder (SAD)
  - Prevention of migraine onset

The evaluation process
- Selecting the appropriate filter to minimize eye discomfort and maximize visual resolution is dependent on an individual sense of what "hurts".
- As a rule of thumb for a successful vision assessment, determining the best filter requires balancing light sensitivity issues with appropriate filter color selection

Evaluation tips
- For maximized visual acuity, select the highest visible light transmission (VLT) possible within a group of filter colors appropriate for the eye disorder. Then, working from lightest to darkest, offer companion products until the patient responds favorably.
- Use a method of trial and error with various filter colors and visible light transmissions to determine the filter.
- Where possible, allow for outdoor testing of colors.
Therapeutic filters
- Absorb visible light energy to provide a more comfortable viewing experience. This visible absorption protects the retina against long-term exposure to high-energy wavelengths, which are associated with the deterioration of the center of the retina and contribute to macular degeneration.
- UV absorption (UV A, B & C) to 400nm—radiation that is related to cataract formation.

Achromatopsia
- Characterized by the lack of normal "cone vision." Where normal eyes have 6 million cone photoreceptors, located mostly at the center of the retina, achronats have far fewer and rely on "rod vision." Rods do not provide color vision or good detail vision, thus achronat patients are typically totally colorblind or almost totally colorblind, and have poor visual acuity.

Achromatopsia
- Effects of Achromatopsia (Varying degrees of effects between achronats)
  - Dazzling Glare Sensitivity
  - Discomfort Glare Sensitivity n Colorblindness
  - Poor Visual Acuity
  - Problems adapting to high levels of light causing photophobia in bright lighting
  - Some photophobes in indoor and low lighting settings.

Filters for Achromatopsia

Age Related Macular Degeneration (AMD)
- Macular Degeneration is the progressive deterioration of the central area of the retina. The disease causes a central scotoma, or a decrease in central vision. While peripheral vision remains intact, mobility is often impaired.

Effects of Macular Degeneration
- Central Scotoma(s)
- Decreased Contrast Sensitivity
- Blurred Vision
- Discomforting Glare
- Dazzling Glare Sensitivity
**Filters for Macular Degeneration**

- 20% Medium Amber
- 15% Amber
- 10% Medium Amber
- 5% Lark Amber
- 5% Total
- 15% Light Yellow
- 5% Lark Yellow
- 5% Light Orange
- 5% Lark Orange
- 5% Orange

**Cataract**

- A cataract is the clouding of the lens of the eye. A cataract is apparent within the lens (nucleus, cortex and capsule) when the nucleus becomes opaque or when small opacities develop in the cortex, blocking or scattering light.

**Cataract**

- Effects of Cataract
  - Blurred distance vision, especially outdoors.
  - Headlights and stoplights appear to have streaks or halos.
  - Discomfort Glare Sensitivity
  - Vehling Glare Sensitivity
  - Decreased Contrast Sensitivity
  - Reading ability is impaired because print appears faded and lacks contrast.
  - Color distinction is impaired. Blues appear green and yellow appear brown.

**Filters for Cataracts**

- Pre-operative:
  - 20.5% Pale Honey
  - 15% Medium Yellow
  - 12% Light Orange
- Post-operative:
  - 20.5% Medium Amber
  - 21.2% Pale Honey
  - 21% Medium Grey
  - 21% Light Grey
  - 19% Medium Blue

**Corneal Pathology**

- Corneal Pathology is characterized by an injury or damage to the cornea resulting in a distorted or clouded image and increased glare sensitivity.

- Effects of Corneal Pathology
  - Contrast Sensitivity
  - Discomfort Glare Sensitivity
  - Loss of Detail

**Filters for corneal pathology**

- 70% Yellow
- 56% Orange
- 35% Amber/Orange
- 52% Red/Orange
Diabetic Retinopathy

- Diabetic Retinopathy is the leaking of retinal blood vessels occurring in advanced long-term diabetics and affecting the macula or the entire retina and vitreous. While not all diabetics develop retinal changes, the likelihood of retinopathy increases the longer a person has diabetes.

Effects of Diabetic Retinopathy

- Discomfort Glare Sensitivity
- Decreased Contrast Sensitivity
- Blurred Vision
- Dazzling Glare Sensitivity
- Unimpaired Peripheral Vision

Filters for Diabetic Retinopathy

- 40% Light Amber
- 10% Medium Amber
- 2% Dark Amber
- 40% Light Grey Green
- 10% Medium Grey Green
- 1% Dark Grey Green

Glaucoma

- Glaucoma is characterized by a blockage of the aqueous humor, the fluid which normally drains from the front part of the eye. As the internal pressure of the eye increases, the optic nerve is compressed, eventually causing the death of nerve cells and possible permanent vision loss.

Effects of Glaucoma

- Decreased Contrast Sensitivity
- Night Blindness
- Decreased Response to Magnification
- Loss of Peripheral Vision
- Increased Illumination Requirements

Filters for Glaucoma

- 25.9% Polarized Amber
- 21.2% Polarized Grey
- 32% Medium Grey
- 32% Dark Grey
- 26% Medium Flint
- 16% Medium Amber
- 16% Medium Yellow
Night Blindness
- Night Blindness is characterized by halos or dazzling glare around headlights, streetlights, and street signs, often associated with AMD cataracts or post-treatment vision-corrective laser surgery

Retinitis Pigmentosa
- A group of diseases, often hereditary, characterized by degeneration of both retinas, beginning in childhood and progressing to blindness by middle age. Clinical signs include a reduced range of vision, an inability to see in dim light, loss of color of the retina, degeneration of the central part of the retina, and eventual vision loss.

Effects of Retinitis Pigmentosa
- Discomfort Glare Sensitivity
- Dazzling Glare Sensitivity
- Decreased Contrast Sensitivity
- Night Blindness
- Decreased Response to Magnification
- Loss of Peripheral (side) Vision
- Increased Illumination Requirements

Filters for Retinitis Pigmentosa
- 15% Amber/Orange
- 52% Red/Orange
- 4% Dark Grey
- 4% Dark Amber
- 40% Orange

ADHD – Symptom Improvement
- Scientists at John Carroll University, working in its Lighting Innovations Institute, have developed an affordable accessory that appears to reduce the symptoms of ADHD. Their discovery also has also been shown to improve sleep patterns among people who have difficulty falling asleep. The John Carroll researchers have created glasses designed to block blue light, therefore altering a person’s circadian rhythm, which leads to improvement in ADHD symptoms and sleep disorders.

ADHD – Symptom Improvement
- How the Glasses Work
  The individual puts on the glasses a couple of hours ahead of bedtime, achieving the circadian rhythm. The special glasses block the blue rays that cause a delay in the start of the flow of melatonin, the sleep hormone. Normally, melatonin flow doesn’t begin until after the individual goes into darkness.
  Studies indicate that promoting the earlier release of melatonin results in a marked decline of ADHD symptoms.
- Advancing the circadian rhythm has been shown to improve both objective and subjective measures of ADHD symptoms in studies of the University of Toronto. Twenty-nine adults diagnosed with ADHD participated in a three-week trial.
**Better Sleep/Disease Prevention/Depression Relief**

- Major uses of the blue-blocking glasses include: providing better sleep, avoiding postpartum depression, preventing Seasonal Affective Disorder and reducing the risk of cancer.

An alternative to the glasses has also been developed in the form of night lights and light bulbs with switchable, block the blue light. Instead of wearing the glasses, an individual may simply turn off ordinary lights and, instead, turn on the ones with filters that remove the blue rays. The night light is a convenient “plug-in” device.

**Relief for Migraine Sufferers**

- May be prescribed tinted lenses with an intuitive colorimeter
  - A device used to illuminate text with different colored lights
  - Creating for each patient an optimal color of light that led to the greatest comfort by reducing distortion
  - The lenses are called “Precision Tinted Lenses” PTL.

**Migraine Relief Scientifically Tested**

- Once in the fMRI machine, subjects were exposed to a range of striped patterns while their brain images were acquired. Then the researchers analyzed the effect of the tinted lenses or the activation of the different visual areas of the brain.

- Specifically, the tinted lenses decreased hyper-activation for migraine sufferers in visual area V2 of the visual cortex of the brain.

- Although patients reported some relief (a 40 percent improvement) using the control lenses, the precision-tinted lenses had a significant effect (71 percent improvement) when viewing the stressful stripes.

**Review**

- Ophthalmic lenses can be used to treat medical conditions
  - Work with your Optometric partners to become educated, then put your knowledge into practice – so many patients will benefit

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